Name: _____ **Period: ____**
Baird

Intro to Circular Motion Group Challenges

Introduction Demonstration: **"Don't Spill the Tea"**

Draw a free body diagram of what you think is happening in this demonstration.

- ☐ **Include vectors**
- ☐ **Include labels**
- ☐ **Include your explanation of this phenomenon**

Challenge Tasks:

Today, you will work in groups to solve different challenges! Record your solutions to the challenges on your paper, but also be prepared to present your solutions (with diagrams) to the other groups at the end of class.

Every group should have prepared a Free Body Diagram of your scenario, along with any science/Physics vocabulary you can use to provide a complete explanation of your phenomenon.

Group Roles:

1. **Recorder:** the person who will record any data or information discovered during the activity
2. **Demonstrator:** the person who will conduct the experiment for the class
3. **Reporter:** the person who will do the speaking to teach the class what your group has learned
4. **Time manager/Leader:** the person who will keep the group on task, while keeping track of the time left to complete the challenge and questions.

Group 1: Strike Zone!

Challenge 1: Your task is to find when you should raise the hula hoop for the ball to hit the block! Be sure to answer all questions to be able to provide a complete presentation to the class.

Draw a complete model of your challenge (be sure to include **labels, vectors**, and any **descriptions** needed to fully explain your phenomenon).

Questions:

1. What did you have to do to get the ball to move around the hula hoop?

2. What did you have to do to get the ball to strike the block?

3. How does Newton's 1st Law (Law of Intertia) apply to this phenomenon?

4. What does this tell us about the motion of the ball?

5. What is a real-world example that uses the same principles as this phenomenon?

Group 2: Get the Ball to Orbit around your Body!

Challenge 2: Your task is to use the meter stick and the ball to make the ball orbit around your body on the floor.

Draw a complete model of your challenge (be sure to include **labels, vectors**, and any **descriptions** needed to fully explain your phenomenon).

Questions:

1. What methods did you try that were unsuccessful?

2. Where did you have to direct the force to make the ball orbit your body?

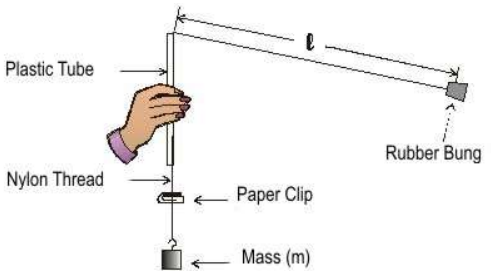
3. Where is the acceleration directed (think about how Fnet and acceleration are related)?

4. What Newton's Laws applied to your phenomenon, be specific, and provide reasoning?

5. What is a real-world example that uses the same principles as this phenomenon?

Group 3: Give it a Whirl (with mass)!

Challenge 3: Your task is to see the effects of changing how much mass is hanging from the equipment.



First, use 100 g, then 200 g masses (but keep the same radius–line marked on the string). Feel free to record extra data and information, as you feel necessary.

SAFETY: Be sure that all members of your group are wearing the proper safety goggles and are a far enough distance from each other (just in case the rubber stopper comes untied)!

Draw a complete model of your challenge (be sure to include **labels, vectors**, and any **descriptions** needed to fully explain your phenomenon).

Questions:

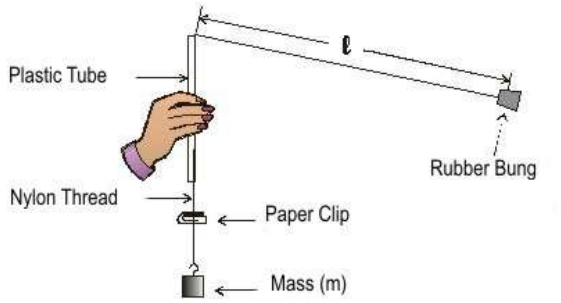
1. How did you get the stoppers to move around in a circle?

2. What did you observe happen when you changed the amount of mass hanging from the equipment?

3. What Newton's Laws applied to your phenomenon, be specific, and provide reasoning?

4. What is a real-world example that uses the same principles as this phenomenon?

Group 4: Give it a Whirl (with radius)!



Challenge 4: Your task is to see the effects of changing the radius of the string from the top of the plastic tup to the rubber stopper. Use the lines marked on the string for your two radii.

SAFETY: Be sure that all members of your group are wearing the proper safety goggles and are a far enough distance from each other (just in case the rubber stopper comes untied)!

Draw a complete model of your challenge (be sure to include **labels, vectors**, and any **descriptions** needed to fully explain your phenomenon).

Questions:

1. How did you get the stoppers to move around in a circle?

2. What did you observe happen when you changed the amount of mass hanging from the equipment?

3. What Newton's Laws applied to your phenomenon, be specific, and provide reasoning?

4. What is a real-world example that uses the same principles as this phenomenon?